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Multinational Companies, Technology Spillovers, and Plant Survival[*]

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Abstract

This paper examines the effect of the presence of multinational companies on plant survival in the host country. We postulate that multinational companies can impact positively on plant survival through technology spillovers. We study the nature of the effect of multinationals using a Cox proportional hazard model which we estimate using plant level data for Irish manufacturing industries. Our results show that the presence of multinationals has a life enhancing effect only on indigenous plants in high tech industries, suggesting the presence of technology spillovers. In contrast, multinationals compete with each other in low tech sectors in the host country.

JEL Classification: F23, L60

Keywords: Multinational Companies, Technology Spillovers, Plant Survival

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I. Introduction

Multinational companies and the associated foreign direct investment (FDI) can have various effects on the host country over and above the inflow of physical capital. In particular, foreign direct investment can lead to the inflow of superior knowledge into the economy, which can be adapted by host country firms. Multinational companies (MNCs) find it profitable to invest abroad because they own firm-specific assets, one of which is the multinational's access to better production technology (Caves, 1996).

Blomström and Kokko (1998) discuss a number of channels through which this superior knowledge may spill-over to other firms located in the host coutry. For instance, arms‘ lengths relationships between host country suppliers and MNCs may mean that domestic suppliers are exposed to new products and production techniques, or they may indeed receive technical or managerial support from their multinational customers. Hence, suppliers learn new production technologies through contacts with MNC customers. Also, there may occur spillovers of technology from MNCs to domestic firms through employees' moving from the former to the latter, taking their knowledge of production techniques with them and applying them in the domestic firm. Therefore, host country firms may benefit from technology spillovers from MNCs, and may be able to improve their productive efficiency as they learn from MNCs.

There have been a number of empirical studies of the presence of technology spillovers between MNCs and host country firms, some of the more recent ones being Blomström and Sjöholm (1999) for Indonesia, Aitken and Harrison (1999) for Venezuela, and Girma et al. (2001) for the UK.[1] These studies usually regress productivity in host country firm *i*, measured as either labour or total factor productivity, on a number of firm and industry variables, using data for manufacturing

industries at a firm or sectoral level. To check for technology spillovers, they also include a proxy for the extent of MNC investment in the sector in which firm *i* operates. The results are mixed, showing that the effects of FDI on technology are different for different countries and sectors.

The mixed results provide evidence for the claim that the absorptive capacity of host country firms is an important determinant of whether or not they benefit from FDI (e.g., Kokko, 1994; Kokko et al, 1996). That is, firms must have an ability to utilise spillovers from multinationals in order to improve their productivity. Glass and Saggi (1998), for example, argue that the technology gap between host and home country indicates the absorptive capacity of host country firms. The larger the gap, the less likely are host country firms to have the human capital and technological know-how to benefit from the technology transferred by the multinationals.

In this paper we present an alternative way of examining technology spillovers from MNCs, based on the following idea: an increase in productivity through technology spillovers will, all other things being equal, reduce a host country firm's average cost of production. This has obvious benefits for the firm and, in this paper, we are concerned with the benefit associated with firm survival. Audretsch (1991, 1995) argues that the probability of firm *i* remaining in industry *j* at time *t* is determined by a firm's price cost margin, i.e., the degree to which price exceeds a firm's average cost. According to this argument a firm's ability to increase price and/or reduce average cost will have a positive effect on firm survival, ceteris paribus. In this framework, technology spillovers from MNCs and the associated increase in productivity enable host country firms to produce at lower average cost for a given level of production,

[1] See Görg and Strobl (2001) and Blomström and Kokko (1998) for recent surveys.

which increases their price-cost-margins. All other things equal, this leads to a higher probability of survival for host country firms.

The presence of multinationals can also have negative effects on the survival of host country firms, however. As Aitken and Harrison (1999) argue, multinationals producing at lower marginal costs than host country firms have an incentive to increase output and attract demand away from these firms. This will cause host country rivals to cut production which, if they face fixed costs of production, will raise their average cost and, therefore, reduce their probability of survival. In fact, regardless of cost structure, increased production by foreign rivals will generally lead to a reduction in output price (at least in the short run) which will reduce profitability and, thus, may negatively affect survival. Also, to the extent that the presence of multinationals leads to higher wage demands in the economy, this will increase a firm's average costs. This, all other things being equal, will also reduce its probability of survival. Whether the effect of MNCs on the survival of host country firms is, on average, positive or negative is, therefore, ambiguous and needs to be decided empirically.[2]

We address the issue of the effects of MNCs on firm survival using the example of the Republic of Ireland, which appears to be a model example to study this effect due to the importance of MNCs for its economy. Data from the Irish Central Statistics Office show that foreign multinationals in Ireland accounted for roughly 47 percent of manufacturing employment and 77 percent of net output in manufacturing in 1996. The corresponding figures in 1983 (the first year for which these data are available) were 38 and 58 percent respectively, which illustrate the increasing importance of multinationals for Irish manufacturing. While indigenous manufacturing tended to be concentrated on traditional and food-sector manufacturing activities, MNCs have invested primarily in

modern high tech sectors. This has led to a rapid increase in the significance of the high tech sectors for the Irish economy (Barry and Bradley, 1997). From the perspective of this paper, the increasing role of MNCs provides us not only with cross-sectional but also inter-temporal variation in the degree of FDI.

Using plant level data for the Irish manufacturing sector we investigate whether the presence of multinational companies in sector *j* has any effect on the survival of plants in the same sector, ceteris paribus.[3] In examining the effect of MNCs on the survival of host country plants we distinguish between the impact of MNCs on Irish-owned (indigenous) plants and on foreign-owned plants (i.e., subsidiaries of other MNCs) located in the host country, the latter essentially serving as a natural control group. While there have been several studies of plant and firm survival for different countries the effect of MNCs on survival has, to the best of our knowledge, not received any in-depth attention in the literature to-date.[4]

One may expect that there are at least two issues that impact on the nature of this effect. Firstly, the effects of greenfield investment by multinationals may be different than takeovers of existing domestic firms. In the case of the former there will be increased capacity which may lead to reductions in output price. Secondly, the market orientation of multinationals may matter. If they produce primarily for export markets, there should be more scope for expanding production without the output price on the host country market being reduced. In contrast, if multinationals serve only domestic markets the negative effects may outweigh any possible positive effects of spillovers. While we do not have plant level data to account for these possibilities in any detail,

[2] Unfortunately, with the data available to us, namely employment data, we are not able to distinguish empirically between the various positive and negative effects, only whether in total positive or negative effects dominate.

[3] In a related paper using the same dataset, Görg and Strobl (2002) find that the presence of MNCs fosters the entry of domestic plants in Irish manufacturing industries.

aggregate data suggest that most of the FDI in Ireland has been greenfield investment (i.e., the setting up of new plants) with on average over 85 percent of output produced by MNCs being exported to world markets (Barry and Bradley, 1997).

The remainder of the paper is structured as follows. In Section 2 we discuss briefly the dataset used. Section 3 examines the effect of the presence of multinationals on plant survival by estimating hazard functions. Section 4 summarises our results and presents some concluding comments.

II. Data Set

In order to investigate the effect of the presence of multinationals on plant survival we use data taken from the *Employment Survey* which is carried out annually by Forfás, the policy and advisory board for industrial development in Ireland. The survey has been undertaken since 1973 and data are available to us for the period 1973 to 1996. The main advantages of the survey are that it covers virtually all known active manufacturing plants, and that the response rate is generally over 99 per cent, thus providing a sample of over 17,000 plants. For these plants we are provided with information on employment, nationality of ownership, sector of location, and start-up year, amongst other things. A plant is classified as being foreign-owned if 50 percent or more of its shares are held by foreign owners.

Given the nature of our data set, the observed life times of some of the plants in the sample is necessarily left censored while others are right censored, and these phenomena are appropriately dealt with in all estimations in the paper.[5] In total our sample covers 17,789 plants, 4,658 of which existed at the beginning of our sample

[4] See, for example, Audretsch (1991), Audretsch and Mahmood (1995) for the US; Mata and Portugal (1994) and Mata et al. (1995) for Portugal; McCloughan and Stone (1998) for the UK and Kearns and Ruane (2001) for Ireland.

[5] All estimations were performed using STATA version 7.0, which can be used to control appropriately for left and right truncation.

period and 6,667 of which existed at the end of our sample period. Of those that existed in the beginning only 1,632 remained at the end of our sample period.

Table 1 provides summary measures of the foreign and indigenous sub-sectors of Irish manufacturing for the years 1973, 1984 and 1996. The indigenous sector has steadily decreased its share of manufacturing employment from roughly 67 to 55 per cent reflecting the growing importance of multinationals for the manufacturing sector. However, the share of indigenous plants has remained relatively constant around 87 percent over the period. This is due to a reduction in the average plant size for domestic plants, while the size of foreign-owned plants has remained fairly constant. One should note also that foreign plants are on average considerably larger than domestic plants.

We have also grouped the 68 sub-sector classifications used throughout this paper into two broader groups – high and low technology sectors – in order to provide and compare summary statistics for indigenous and foreign plants within sectors of different technology intensity.[6] The statistics show that indigenous high tech plants are considerably smaller than foreign high tech plants and, while their average size has fallen since 1973, the size of foreign plants has risen over the sampling period. Most notably, the employment share in high tech sectors in indigenous plants has fallen over the period from 44 to 23 percent, indicating the dominance of foreign-owned plants in this technology group.

The low tech sector, in contrast, is dominated by domestic plants. Their employment share has remained constant at about 70 percent of total employment. One should note that the average size of both foreign and indigenous plants in total

[6] The classification of sectors into high tech and low tech is based on an OECD classification as used by Kearns and Ruane (2001). We aggregate the OECD's medium and high tech sectors to define our high tech group. Accordingly, high tech sectors are Aerospace, Computers & Office Machinery, Electronics & Communications, Pharmaceuticals, Scientific Instruments, Electrical Machinery, Motor Vehicles, Chemicals, Non-electrical Machinery.

manufacturing has fallen, although that of indigenous plants still remains substantially smaller.

[Table 1 here]

III. Modelling Plant Survival using a Hazard Function

The aim of this paper is to determine whether the presence of multinationals has an effect on the survival of both indigenous and foreign plants in Irish manufacturing. It has been established in the empirical IO literature (as cited above) that there are many factors that can possibly affect plant survival. In order to properly disentangle the role of plant and industry specific factors from that of the presence of MNCs on the survivability of plants we turn to a semi-parametric modelling of plants' hazard rates.

Following the related empirical literature (for example, Audretsch and Mahmood, 1995, Mata and Portugal, 1994) we utilise a Cox proportional hazard model (Cox, 1972) as our equation to be estimated. The Cox proportional hazard model does not require any restrictive assumptions regarding the baseline hazard, such as for instance a Weibull or lognormal specification. This is appropriate for our purposes, as our main interest is not in the estimation of the underlying baseline hazard but in the effect of the presence of MNCs on plant survival. As pointed out in the literature on survival analysis, the semi-parametric modelling approach of the Cox proportional hazard model is advantageous if the parametric form of the underlying baseline hazard function is not known with certainty.

The Cox proportional hazard model specifies the hazard function $h(t)$ to be the following:

$$h(t) = h_0(t)e^{(X\beta)} \qquad (1)$$

where $h(t)$ is the rate at which plants exit at time t given that they have survived in t-1, h_0 is the baseline hazard function (the parametric form of which is not specified) when all of the covariates are set to zero, and X is a vector of plant and industry characteristics postulated to impact on a plant's hazard rate. The following covariates are included:

SIZE is the plant's size in terms of employment at time t and is included since it can be considered a stylised fact that small plants generally have lower probabilities of survival than large plants (for example, Audretsch and Mahmood, 1995; Mata and Portugal, 1994). Also, Mata et al. (1995) find that current plant size is a better predictor of plant failure than initial size. Hence we include size at time t in the regression.

The minimum efficient scale of the industry, *MES*, is measured as the log of median employment size in sector j as in Sutton (1991).[7] Our a priori expectation as to the sign of the coefficient is ambiguous. On the one hand, one may expect plants entering industries with large minimum efficient scale to have lower probabilities of survival than plants entering other industries, as small entrants may find it difficult to attain the efficient level of production unless they experience sufficient growth in their infancy (Audretsch, 1991; Mata and Portugal, 1994). On the other hand, as Audretsch (1991) points out, industries with high MES are usually also industries showing high price cost margins, which should increase plant survival.

HERF denotes the Herfindahl index of sector j, measured in terms of plants' employment shares. Again, the expectation of the effect of market concentration on survival is not clear-cut. Higher market concentration may lead to higher price-cost-margins in the industry which, ceteris paribus, should increase a plant's probability of survival. However, plants in highly concentrated markets may be subject to fierce

[7] In an alternative specification we defined MES as (the log of) average plant size in the industry. These results, which are not reported here but can be obtained from the authors upon request, yield similar results to the results obtained using median size. We are not able to calculate any additional alternative measures of MES due to lack of appropriate data.

aggressive behaviour by rivals which may reduce chances of survival. One should note that because we are not able to completely identify all plants belonging to the same firm our HERF is based on plant rather than firm data and thus is an inferior (to that based on firm level data) measure of industry concentration. However, in the Irish case this is likely to be less problematic as the size of the domestic market and the importance of the export market for foreign firms means that most foreign and domestic firms are single plant firms.

GROWTH is the net sectoral (employment) growth rate. Audretsch (1991) argues that industry growth may elevate the price above the long-run average cost, i.e., increase firms' price-cost-margin which would, all other things equal, affect survival rates positively. The sectoral growth rate also allows us to control for other sector specific cyclical effects which may impact on plant survival.

Most importantly from our point of view, *MNC* is a proxy for the presence of multinationals in a sector and is defined as the share of employment by MNCs in sector *j* at time *t*. This variable is supposed to capture the spillover effects of multinationals on plant survival. If positive spillover effects occur, the presence of MNCs should have a positive effect on plant survival.

All sector specific variables are calculated for the 68 sub-sector classifications commonly used by the Irish Central Statistics Office. Table 2 provides some summary statistics on these sectoral variables. It is worthy of note that there is substantial variation in these variables, not only cross-section but also over time.

[Table 2 here]

The specification of equation (1) also includes a number of dummy variables. *TECH* is a dummy variable equal to one if the plant is operating in a sector categorised to be of high technology. This should allow taking into account different potentials for

innovation in high and low tech industries, since a plant's ability to innovate has been found to be an important determinant of survival (see Audretsch, 1991, 1995). *BEU* takes the value of one if the plant came into existence prior to Ireland's entry into the European Union (EU) in 1973 and is intended to control for different policy regimes at the time of start-up. A further dummy variable is *OWN* taking on the value of one if the plant is foreign-owned and zero otherwise. Finally, we also include time dummies to control for year specific macroeconomic effects.

The results of estimating different variations of the hazard model described in (1) using data for the total sample are presented in Table 3.[8] All estimations are stratified by sector, which allows for equal coefficients of the covariates across strata (sectors), but baseline hazards unique to each stratum (sector). As can be seen, the log likelihood and Wald tests provide satisfactory support for our model specifications. In interpreting the results one should recall that our dependent variable is the hazard rate, i.e., a negative coefficient on an independent variable implies that it reduces the rate of hazard, thus increasing chances of survival, all other things equal.

[Table 3 here]

In the base specification in column (i) we find that a greater presence of MNCs, measured in terms of share of employment in foreign multinationals, acts to increase the survival of plants.[9] This result suggests that there may be technology spillovers from MNCs to other plants in the same industrial sector, as argued above. This would lead to a reduction of average cost for the benefiting plant, which, ceteris paribus, increases its probability of survival.

[8] The reported regression results are based on the sample of plants described above which includes incumbents as well as new entrants. We also estimated the survival regressions using new entrants only. The results, which can be obtained from the authors upon request, are qualitatively similar to the results reported here.

[9] We also experimented with including up to two lags of the foreign presence variable in this and subsequent regressions. In none of the cases did the lagged variables prove to be significant determinants

An alternative interpretation of this positive effect could be that multinationals locate in industries that have higher productivity (as argued by Aitken and Harrison, 1999) and hence higher survival rates. In this case, the positive result would of course not necessarily indicate spillovers. Aitken and Harrison (1999) suggest to include sectoral dummies to control for such a possible bias. In our estimation, the baseline hazard is stratified by sector, which allows for different baseline hazards per sector. This, similar to sectoral dummies, should take account of possible productivity differences across sectors.

There a number of possible reasons of why we, in contrast to Aitken and Harrison (1999), find evidence of positive spillovers despite controlling for time invariant sector specific effects. Firstly, it may be that, in contrast to domestic firms in many developing countries, Irish plants have relatively more absorptive capacity to avail of spillovers from multinationals. For instance, in their study of Spain, Barrios and Strobl (2002) find that only domestic firms that were likely to be more technologically advanced, as proxied by the incidence of R&D and/or exporting activity, benefited from foreign presence in Spain. It may also be that because studies of direct productivity spillovers, like Aitken and Harrison (1999), only measure potential spillovers for continuing plants, they are missing a substantial proportion of the impact, namely that on plant exit. However, it must also be noted that under the argument presented here the impact of foreign presence on the productivity of domestic plants is, in contrast to studies like Aitken and Harrison (1999), assumed to act indirectly through its impact on a plant's price-cost-margin.

In terms of our other results, we also discover that plant size turns out to affect survival positively, i.e., small plants face a higher hazard of exit than do large plants.

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of domestic plant survival and we hence do not report these results, but will make them available upon request.

As pointed out above, this is a fairly standard finding in studies of survival; our result is, thus, in line with a large body of other empirical studies. Not surprisingly, we find that benevolent economic sectoral conditions, as measured by the sectoral growth rate, decrease the hazard of plant exits. In other words, fast growing markets appear to increase plant survival. This finding is in line with Mata and Portugal (1994) who find that, for Portuguese firms, fast growing markets make survival easier for new entrants. Our results also suggest that, the higher the level of industry concentration, the less likely a plant is to survive. The coefficient on minimum efficient scale, another variable picking up industry characteristics, is statistically insignificant.

Turning to the dummy variables, we find that, controlling for other factors, foreign plants have higher hazards of exiting than indigenous plants. We do not find a difference in the hazard rate for plants located in high and low tech sectors, as indicated by the statistically insignificant coefficient on *TECH* once other sector and plant specific factors are controlled for. Finally, we find that plants that started up before Ireland's entry into the EU have a lower rate of survival than those that were born after this policy regime change. This may not be surprising given that many of these firms would have still enjoyed tariffs and other forms of protection until Ireland's EU entry. As Walsh and Whelan (2000) argue, many of such firms failed to adapt to the new challenges of the opened-up markets and subsequently declined since then.

In estimating the hazard model using data for all manufacturing industries we are implicitly assuming that the effect of the explanatory variables is uniform across different plant types. This is arguably a quite restrictive assumption, given that we pool plants of different nationalities operating in sectors of different technology intensities. For example, a priori, one may expect these two characteristics to impact upon whether or not plants are positively or negatively affected by the presence of multinationals in

the same sector. As regards nationality, foreign-owned and domestic plants have different market orientations, with the former being mainly export oriented and the latter serving mainly domestic markets (see Barry and Bradley, 1997). Therefore, foreign plants are more likely to be in competition with other multinationals located in the sector serving the same export or domestic markets and may therefore be more likely to experience a negative competition effect. Indigenous plants, on the other hand, may be less likely to experience such negative effects. One can also easily make similar arguments with regard to the other explanatory variables, and, while their impact may not be the explicit focus of this paper, restricting these to be similar across nationality types could feasibly bias our results on the foreign presence variable.

In terms of technology, we expect foreign owned plants to have higher technology levels than domestic plants operating in the same sector, reflecting their firm specific assets (Caves, 1996). Domestic plants operating in high tech sectors may then be more likely to benefit from positive spillovers as they can be assumed to have relatively high levels of technology themselves. They, thus, can be expected to have some level of absorptive capacity, i.e., the necessary stock of knowledge which allows them to utilise spillovers from multinationals. This may not be the case for domestic plants operating in low tech sectors. As with nationality types, it may also be important to allow for variation across technology groups in the other explanatory variables for an unbiased estimate of the impact of foreign presence.

In order to investigate these issues we first re-ran the hazard model including interaction terms of the ownership and high tech dummies with the MNC variable, thus allowing the coefficients of the MNC variable to vary across these two firm types. The results of this are presented in the second column of Table 3 and, as can be seen, the interaction terms are insignificant. It is also noteworthy that including these interaction

terms makes the coefficient on the ownership dummy insignificant, suggesting some correlation between these variables that would be difficult to disentangle.

Hence we proceeded to investigate whether all coefficients should (jointly) vary across ownership type by implementing a likelihood ratio test in order to compare such an unrestricted model with the previous restricted model without interaction terms. The resultant likelihood ratio test statistic (47.61) was highly statistically significant, allowing us to reject the hypothesis that one can pool the data across these two plant types. We also experimented in a similar manner whether we can pool the data across the two broad sector groups, namely high and low tech sectors, for the indigenous and foreign samples separately. For the case of indigenous plants the likelihood ratio test statistic (22.87) was significant at the one per cent level, suggesting that even within the indigenous group sample our model needs to be estimated separately for the high and low tech sector groups. In contrast, the resultant likelihood ratio test statistic (5.60) for foreign plants was statistically insignificant, thus indicating that the coefficients on the covariates jointly did not differ significantly across the broad sector groups for these.[10]

These results suggest that it is sensible to split the total sample into indigenous and foreign sub-samples. Also, for the indigenous sub-sample our test suggests that it is necessary to break it into high and low tech sub-samples. For consistency purposes we also broke the foreign sub-sample into the two broad sector samples. We then re-estimated the hazard model for these four groups. The results are reported in columns (iii) to (vi) of Table 3.

We focus our attention on MNC as the main variable of interest. For domestic plants we find that the presence of multinationals has a positive effect on plant survival only for plants operating in high tech sectors. The coefficient on this variable for the

[10] The results of these estimations are not reported here but can be obtained from the authors upon request.

low tech sub-sample is statistically insignificant, suggesting that survival for this group is not affected by multinational presence. This finding is in line with the idea that plants need to have some level of absorptive capacity in order to be able to benefit from spillovers. High tech plants may be expected to have such a capacity, while low tech plants may not.

Turning to the foreign sub-sample we find that our estimations turn out positive coefficients on the *MNC* variable, although the coefficient is only statistically significant for the low tech sectors. This suggests that the presence of multinationals in the sector reduces the survival of other foreign-owned plants in low tech sectors. This is consistent with the idea that foreign plants are in competition with other multinationals located in the same sector, thus exerting negative effects on plant survival. One may expect this effect to be relatively more prevalent in sectors where multinationals produce more for the domestic market, such as the low tech sectors in Ireland.[11]

[Table 4 here]

IV. Conclusions

This paper examines the effect of the presence of multinational companies on plant survival in the host country. We postulate that MNCs can impact positively on plant survival through technology spillovers. If such technology spillovers take place, the receipt of a superior technology by the recipient plant will lower its average cost of production which, all other things being equal, will increase a plant's probability of survival. However, multinationals can also have negative effects on plant survival through reducing output price; forcing domestic firms to reduce production and thus

[11] Data available from the *Irish Economy Expenditure Survey* database, also maintained by Forfás, indicate that in 1996 foreign plants in low tech sectors exported around 69 percent of output compared to 93 percent in high tech sectors.

increasing their average costs of production; or through crowding out domestic rivals by increasing the wage rate in the economy.

We study the nature of the effect of multinationals using data for the Irish economy, an economy with high levels of involvement of foreign MNCs. In our empirical analysis, using a Cox proportional hazard model we find that, controlling for other plant and sector specific effects, the presence of multinationals has a life enhancing effect only on domestic plants operating in high tech sectors. This suggests that there may be technology spillovers taking place. We do not find any evidence for such an effect on the survival of domestic low tech plants. This perhaps indicates the lack of absorptive capacity of low tech plants, i.e., their inability to absorb the relevant knowledge from multinationals. If this is the case, there would clearly be scope for policy intervention targeted at assisting low tech indigenous plants to increase their learning ability.

We also find evidence that the presence of multinationals has a negative effect on the survival of other foreign owned plants in the low tech sectors. This may reflect that a negative competition effect emanating from the presence of multinationals in the sector in which the foreign plant operates outweighs any potential positive spillovers.

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Table 1: Descriptive Statistics by Nationality

Sample		1973	1984	1996
Total	*employment*	151741	126687	120728
Indigenous	*plants*	4039	6448	5830
	size	38	20	21
	employment	73827	80550	97559
Total Foreign	*plants*	619	861	837
	size	119	94	117
of which				
	employment	11492	12452	16726
Indigenous	*plants*	313	651	805
High Tech	*size*	37	19	21
	employment	14924	30767	54519
Foreign High	*plants*	137	328	377
Tech	*size*	109	94	145
	employment	140249	114235	104002
Indigenous Low	*plants*	3726	5811	5025
Tech	*size*	38	20	21
	employment	58903	49783	43040
Foreign Low	*plants*	482	536	460
Tech	*size*	122	93	94
Indigenous	*Total*	0.87	0.88	0.87
Share of Plants	*High Tech*	0.70	0.66	0.68
	Low Tech	0.88	0.92	0.92
Indigenous	*Total*	0.67	0.61	0.55
Share of	*High Tech*	0.44	0.29	0.23
Employment	*Low Tech*	0.70	0.70	0.71

Table 2: Description of Sectoral Variables

	Mean	Max	Min	St. Dev. (total)	St. Dev. (time)
FOR	0.10	1.00	0.25	0.25	0.03
GROWTH	0.01	0.96	-0.49	0.10	0.06
HERF	0.12	0.01	0.94	0.12	0.04
MES	2.25	94.5	1	7.42	0.55

Table 3: Results of the Cox Hazard Rate Regression

	All Sectors		High Tech		Low Tech	
	(i)	(ii)	(iii)	(iv)	(v)	(vi)
	All	All	Foreign	Indigenous	Foreign	Indigenous
SIZE	-0.007**	-0.007**	-0.008**	-0.014**	-0.006**	-0.008**
	(0.001)	(0.001)	(0.002)	(0.004)	(0.001)	(0.001)
MNC	-0.340**	-0.444*	1.350	-1.794*	1.398**	-0.076
	(0.072)	(0.189)	(1.918)	(0.831)	(0.539)	(0.228)
OWN	0.240**	0.104	---	---	---	---
	(0.044)	(0.198)				
TECH	0.242	0.284	---	---	---	---
	(0.128)	(0.146)				
OWN*MNC	---	-0.115	---	---	---	---
		(0.205)				
TECH*MNC	---	0.310	---	---	---	---
		(0.400)				
MES	0.007	0.007	0.068	0.027	0.010	0.011
	(0.009)	(0.009)	(0.086)	(0.041)	(0.018)	(0.014)
HERF	0.001*	0.001*	-0.000	0.000	0.003	0.001
	(0.000)	(0.000)	(0.002)	(0.002)	(0.001)	(0.001)
GROWTH	-1.148**	-1.149**	-0.462	0.822	-1.478*	-1.310**
	(0.161)	(0.161)	(1.020)	(0.631)	(0.613)	(0.179)
BEU	0.121*	0.122**	0.660*	0.199	0.088	0.107*
	(0.047)	(0.047)	(0.271)	(0.164)	(0.151)	(0.054)
# of obs.	149555	149555	6771	14641	11803	116340
# of subj.	14388	14388	596	1495	1080	11217
Log Likelihood	-36683	-36682	-690	-3025	-1417	28870
Wald Test (β_i=0)	45708**	45711**	136**	235**	158**	1519**

Notes: (a) Heteroskedasticity consistent standard error in parentheses. (b) ** and * imply significant at 1 and * at 5 per cent level, respectively. (c) Time dummies included in all regressions.